AAPG
Advancing the World of Petroleum Geosciences

Written testimony submitted to:
Senate Appropriations Subcommittee on
Energy & Water Development Agencies
in support of Department of Energy programs

by

Lee F. Krystinik, Ph.D.
President**,** American Association of Petroleum Geologists

To the Chair and Members of the Subcommittee:

Thank you for this opportunity to provide testimony on the importance and need for strong federal R&D efforts in the fields of oil and natural gas, coal, and geothermal technologies. These activities reside in the U.S. Department of Energy's (DOE) fossil energy program (oil, natural gas, coal), and energy efficiency and renewable energy program (geothermal). In addition, a new crosscutting program for subsurface engineering integrates Office of Science activities with these applied research areas. These are an essential investment in this nation's energy security.

The American Association of Petroleum Geologists (AAPG) is the world's largest scientific and professional geological association. The purpose of AAPG is to advance the science of geology, foster scientific research, and promote technology. AAPG has over 40,000 members around the world, with nearly two-thirds living and working in the United States. These are the professional geoscientists in industry, government and academia who practice, regulate and teach the science and process of finding and producing energy resources from the Earth.

AAPG strives to increase public awareness of the crucial role that geosciences, and particularly petroleum geology play in energy security and our society.

You are certainly aware of how oil and gas from shales has quickly boosted domestic energy production, adding well-paying jobs, stimulating manufacturing and enhancing U.S. energy security. This energy renaissance would not have been possible without fossil energy R&D, started in the 1970s at the DOE's predecessor agency, the Energy Research and Development Administration (ERDA).

Methane hydrates could well represent the next energy renaissance. Methane is the predominant component of natural gas. Hydrates below artic permafrost and in sediments of the Outer Continental Shelf hold vast quantities of this potential resource. The DOE fossil energy program began research on methane hydrates in 1997, when methane hydrates were only a scientific curiosity. By the winter of 2011-2012, the DOE, in partnership with ConocoPhillips and Japan Oil, Gas and Metals National Corporation (JOGMEC), successfully completed a research well on the Alaska North Slope to produce experimental quantities of methane from subsurface hydrates.

The DOE is now soliciting proposals for additional field experiments in Alaska. U.S. scientists lead the world in scientific understanding of this resource and continued federal R&D support will enable us to remain at the forefront of developing this novel resource. Methane hydrate also has a significant role in the global carbon cycle and it is gaining recognition as an important component player in global climate processes and climate change. With increased funding DOE-supported scientists can accelerate this critical research area.

AAPG supports funding of the DOE methane hydrate program at an annual level of $40 to $50 million, which would help move this novel, potential energy source toward commercialization.

What is frequently misunderstood, however, is that the federal energy R&D investment cannot be solely focused on new and alternative energy sources. Growing domestic production from shales, is resulting in on-going improvements in efficiency and environmental safety. But fully realizing the potential of these resources for the benefit of U.S. consumers requires additional scientific insights and technological breakthroughs. After all, our nation is not facing a choice between existing and new energy sources, although that is often how the energy debate is framed. Instead oil, natural gas, and coal currently supply 82 percent of the nation's energy. These resources are the foundation of our energy future. Upon this foundation we are now developing and deploying new and alternative energy sources.

Our nation's R&D policies must recognize the need to keep this foundation strong while simultaneously investing in the energy sources of the future.

Oil and natural gas technologies program

AAPG strongly urges increased funding for the DOE oil and natural gas technologies programs. They are regularly either targeted for elimination or funded at levels insufficient to conduct necessary field experiments. This is ironic considering oil and natural gas deliver 62 percent of our nation's energy.

Oil supplies the overwhelming volume of all transportation fuels. Natural gas heats homes and businesses, generates electricity, is a chemical feedstock, and is emerging as a potential transportation fuel. Supplying the oil and natural gas consumed today and in the future requires significant technological advancements.

Several commonly overlooked trends in the oil and natural gas sectors support a federal role in oil and natural gas technologies R&D:

1. **The independent oil and gas producer is responsible for finding and producing most U.S. oil and natural gas resources.** According to the Independent Petroleum Association of America (IPAA), a trade association, independent producers produce 54 percent of the nation's oil, 85 percent of the nation's natural gas, and develop 95 percent of the nation's oil and natural gas wells. The median-sized independent producer is the epitome of American small business. Technology is vitally important for these **producers, who do not have the capacity to conduct independent research.**

2. **Increasingly domestic oil and natural gas production is coming from non-traditional (unconventional) resources**, such as the Marcellus Shale of Appalachia or the Bakken formation of the Williston Basin. The Monterey Shale of California is a new, huge but geologically unique resource that will require additional scientific study and new technologies to develop. These resources hold the key to American energy security, but their development requires significant R&D investment.
3. **Federal R&D has historically provided support for the nation's universities and colleges**, which have proven to be a rich source of technological innovation. But as federal support for oil and natural gas technology development has waned, so has the ability to conduct this type of research and train the next generation of U.S. scientists and engineers. There is a serious workforce shortage rapidly approaching both industry and government.

A robust federal R&D program in oil and natural gas technologies, according to a 2010 study by the National Research Council "could help to provide greater energy security for the United States and to help address future energy needs globally."

AAPG requests the Subcommittee on Energy & Water Development and Related Agencies appropriate $100 million for oil and natural gas technology programs in the Department of Energy's Office of Fossil Energy. This program includes research supporting increased, environmentally responsible production of domestic oil and natural gas resources including methane hydrates, and the interagency unconventional oil and gas research program with EPA and USGS. This funding recommendation helps mitigate the FY 2014 termination of the $50 million per year funding for the Research Partnership to Secure Energy for America.

Coal program
The nation's coal resource is essential to U.S. energy security. AAPG supports research and development funding for coal, including clean coal technologies such as carbon capture and sequestration (CCS). Potential federal restrictions in greenhouse gas emissions from coal-fired power plants will require advancements in the use of CO_2 for enhanced oil recovery and CO_2 storage in saline aquifers. Additional research and large-scale field trials are necessary to bring geologic storage and sequestration of CO_2 to commerciality.

AAPG supports $80.1 million for Carbon Storage R&D in the President's FY 2015 request.

Geothermal energy technologies program
Geothermal energy is an important alternative energy resource that provides base-load power to the nation's electrical grid. Significant expansion of geothermal power production may be possible through the development of enhanced or engineered geothermal systems, but developing and proving these technologies requires R&D investment.

AAPG supports $61.5 million for the DOE geothermal program, the President's FY 2015 budget request.

Subsurface Engineering
DOE is proposing a new cross-cutting activity that integrates basic and applied research for characterizing, engineering and monitoring geologic environments, and benefits energy production, energy storage, CO_2 storage and disposal of hazardous materials.

AAPG supports the President's FY 2015 request of $192 million for this cross-cutting activity.

Summary
Thank you for the opportunity to present this testimony to the Subcommittee. Our nation has the resources and capacity for a bright energy future. Ensuring this future requires prudent investment in R&D to deliver the science and technology needed to safely and efficiently supply the conventional energy sources we will rely on in coming decades, and the breakthroughs in new and alternative energy sources that will power the future.

If you have any questions about AAPG or this testimony, please contact Edith Allison, the director of our policy office in Alexandria (phone: 202-643-6533, email: eallison@aapg.org).